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THE CASE FOR SELF-BASED METHODOLOGY IN MATHEMATICS TEACHER EDUCATION

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How might it be possible to research the growth of a mathematics teacher educator in a way that is meaningful to self and others? In this theoretical/methodological report, I explore issues pertinent to research where self is both the observer and the observed. By starting from a research problem, this paper presents the case for self-based methodologies in mathematics teacher education through an examination of self-observation from research in the domain of psychology and existing self-based methodologies in teacher education literature in pursuit of a legitimate approach to enquiry. This paper is a positive move towards one such methodology.

A (NON-)IDEAL-TYPICAL RESEARCH REPORT

In his opening plenary lecture at PME-42, Mogens Niss characterised the ‘ideal-typical’ mathematics education journal paper and, in contrast to this, appealed to the mathematics education community about the importance of publishing “non-empirical papers that focus on an issue... on analysing, comparing or linking theoretical frameworks, or on presenting and analysing methods” (Niss, 2018, p. 47)

In the same plenary lecture, Niss reminded us of Arcavi’s (2000, p. 145) distinction between “Problem-driven research” and “Theory-driven research” in mathematics education. In the examples of research that Arcavi proposed in his paper, he placed himself closer to a problem-driven orientation and emphasised how:

- (a) a broad theoretical predilection underlies all what we do (but does not blind us) and (b) theory (or, in some cases, theories) is to help us find ways and insights to conduct the research. (Arcavi, 2000, p. 163)

This paper is one such (non-)ideal-typical research report that was partly motivated by a comment made to me during my own PME-42 presentation (Helliwell, 2018) which was roughly “the problem is you are researching yourself, you need to research somebody else”. This problem-driven research report presents a response to that comment and my search for a self-based methodology (SBM) that is underpinned by the theoretical foundations of self-observation. My intention in this paper is to examine some of the issues that such SBMs present (such as those I can only assume my audience member was talking about) by exploring existing self-observational approaches and in doing so move towards the formulation of a methodology that enables me to make sense of my own lived experiences as a mathematics teacher educator (MTE). As Arcavi proposed as a legitimate approach to research, I begin with

the problem from which point I then “pursue it” and “shop around for frames which may help me to make sense of what I find.” (Arcavi, 2000, p. 145).

BEGINNING WITH THE PROBLEM(S)

My research problem

Behind every piece of research lies at least one human being. Sometimes there is a personal motivation for research activity, other times it is a professional one. For the last three years I have been collecting data in different forms and from different settings. Before this time, I was a secondary school teacher of mathematics for 13 years, a role in which I had developed expertise. In my move to a new role, as a university MTE, working primarily with prospective teachers of mathematics but also with groups of more experienced teachers of mathematics with a common interest (e.g., developing the use of mathematical reasoning in their classrooms), I found that the expertise I had developed as a teacher, was necessary but not sufficient for me working with these teachers. I needed to develop a new expertise and became interested in understanding both what this expertise looked like and how the development might happen. I have a desire to better understand myself in my role as an MTE so that I can develop my practice and hopefully the practice of others with similar interests. The problem I have set myself is to make sense of *what* and *how* I am learning as an MTE by placing myself as the subject of research. By researching my own growth and understanding more about the process of becoming an MTE, I hope to contribute to the growing area of research and knowledge on MTE learning. One such contribution is the development of an SBM which this paper is a positive move towards.

A problem for the mathematics education community?

At a symposium last December that was held to mark the retirement of a dear friend and colleague, Laurinda Brown, Olive Chapman gave a seminar on SBMs in MTE learning. She talked of the recent meeting of the North-American chapter of the IGPME group (PME-NA 2018) where she had been involved in a working group whose interest was in developing the use of studies within mathematics education that privilege the self. Both in the working group’s paper (Suazo-Flores, Kastberg, Ward, Cox, & Chapman, 2018) and during the symposium, a tension was expressed between the importance of developing research methodologies that aim to understand and improve the practice of MTEs and the pressure as research academics of publishing research in established and ‘prestigious’ *mathematics* education journals where articles documenting SBM are the exception (e.g., Hjalmarson, 2017).

In contrast to this shortage of papers within mathematics education journals, self-based study is a well-established genre of research within the teacher education community more broadly. Much activity originated from a group of teacher educators that, in 1994, began a special interest group (SIG) of AERA (American Educational Research

Association) known as the ‘Self-study of teacher education practices’ (S-STEP) SIG. The S-STEP community initiated an international biennial conference (the Castle Conference) that began in 1996 and from this point onwards, there has been an ever growing collection of books published, including in 2004, the *International handbook of self-study of teaching and teacher education practices* (Loughran, Hamilton, LaBoskey, & Russell, 2004) and (to date) the 19-volume S-STEP book series, volume 1 and 2 of which were published in 2005. Around the same time, the journal *Studying teacher education: A journal of self-study of teacher education practices* was launched and since then more than 35 issues have been published which include a modest number of articles with a mathematics education focus. Is it time for the mathematics education community to more fully embrace this new genre of research?

The remainder of this paper is one attempt at bringing to light this possibility through firstly exploring the notion of self-observation from research within the field of psychology to examine existing SBMs from (mathematics) teacher education literature towards the articulation of an SBM for my own research, as an MTE.

SELF-OBSERVATION

The observation of ‘objects’ (including other human beings) is viewed as a fundamentally different activity (both ontologically and epistemically) to the observation of the ‘self’. One familiar distinction between ‘objective’ knowledge and self-observation is that the former is based on “public, verifiable, external, and transparent entities” while the latter concerns only “private, idiosyncratic, and internal experience” (Clegg, 2013, p. 5). With these characteristics in mind comes the necessary consequence of any enquiry based on self-observation as epistemological solipsism where the firm assumption is that an observer can only ever know their *own* mind. From this position, it becomes meaningless to suggest that self-observation as a method has anything to contribute to the production of general knowledge. At the level of experience, however, the distinction between external/internal objects of perception can of course be abandoned, since, as Clegg puts it, there is “no meaningful way to conceptualise an “external” perception” (p. 6), such terms are in fact contradictory. In the words of Maturana (1987, p. 65) “everything is said by an observer”, that is, no knowing is independent of the observer, no experience is independent of the experienter, there is no true subjective/objective divide:

Rather than pretending to create objective observer-independent knowledge or retreating into an inner subjectivity, we can use critical methods together with inner subjectivity to bring about a maximum of intersubjectivity, that is, understanding the Self to understand the Other (Roth, 2005, p. 15)

In a self-based enquiry, the self both observes and is observed. One prominent method of self-observation from the field of psychology is that of Introspection (where, having been trained, it is considered possible to carefully and objectively analyse the content of your own consciousness). The practice of self-observation within the phenomenological traditions, where the focus is on uncovering the essential features

of lived-experience, is also prevalent. Over time, phenomenology's conceptual approach to self-observation was transformed from "an *observation of the self* to the *self's detached observations of experience*... and finally to the *self's engagement with the meaning of lived experience*" (Gantt & Thayne, 2013, p. 166, emphasis in original).

The observing self cannot be separated from the world of lived experience that constitutes it as an observing self and, thus, the self cannot observe itself in an "objective" or detached manner. This does not, however, make self-observation an unreliable or unscientific form of psychological inquiry. Rather, it simply means that we must acknowledge and take account of the relational and experiential context in which all self-observation necessarily takes place. (Gantt & Thayne, 2013, p. 167)

According to Clegg (2013) a good theory of self-observation needs to account for and make sense of "the differences in inter and intrasubjective agreement across both experience-near and experience-distant self-observations" (p. 14). He goes further to make clear the importance of accepting the difference between the observer's and interpreter's frames of reference and to place emphasis on "the negotiations that bring these multiple and nonstandard frames of reference into relation" (p. 14). This shift towards seeing the value not only from working on one's own experiences in-the-moment, but also with retrospective accounts of one's own experiences with others, leads me to consider carefully the practice of self-observation as described within the narrative traditions in such forms as narrative inquiry and autoethnographic writings. Such approaches are becoming more commonly used within educational research and teacher education specifically. I will later be exploring these approaches in more detail in the context of mathematics teacher education.

The self of self-observation

The status and nature of the self are issues that receive a great deal of attention within fields such as sociology, psychiatry, developmental psychology, philosophy of mind, social theory, cultural studies, and cognitive neuroscience. Whether self is a social construct, an experiential entity or indeed exists (in reality or virtually) is a topic of much debate amongst interested parties. Some traditions, such as Buddhism, question the legitimacy of the notion of self entirely, as do several philosophers, both modern and contemporary. Furthermore, rather than self taking some form of experiential reality, some authors claim that self only exists in linguistic form, as a narrative fiction, as self that is constructed. For others the self is understood as pure ego-pole, independent of experience, that remains unchanged throughout the life of the individual. Since self as pure ego-pole is viewed as pure subject of experience, it cannot be objectified, that is, the self is not something which in itself can be experienced.

According to philosopher and psychologist, Harré (2001), "the word "self"... appears in person-centered discourses in at least three psychologically diverse contexts:

perception, reflection, and social interaction” (p. 60). From each context there exists an associated form of self that Harré calls Self 1, Self 2, and Self 3 respectively. It follows that any SBM underpinned by an ontological position that involves multiple selves, requires multiple methods of data collection and analysis that can take account of this plurality.

EXISTING SELF-BASED METHODOLOGIES

Attempts have been made, including by members of the PME-NA 2018 working group (Suazo-Flores *et al.*, 2018), to draw out distinctions between such SBMs as “narrative (a look at a story of self), autoethnography (a look at self within a larger context), and self-study (a look at self in action, usually within educational contexts)” (Hamilton, Smith & Worthington, 2008, p. 17) all of which are used in studies that privilege the self in research design. It is acknowledged, however, that the boundaries between such methodologies are blurred:

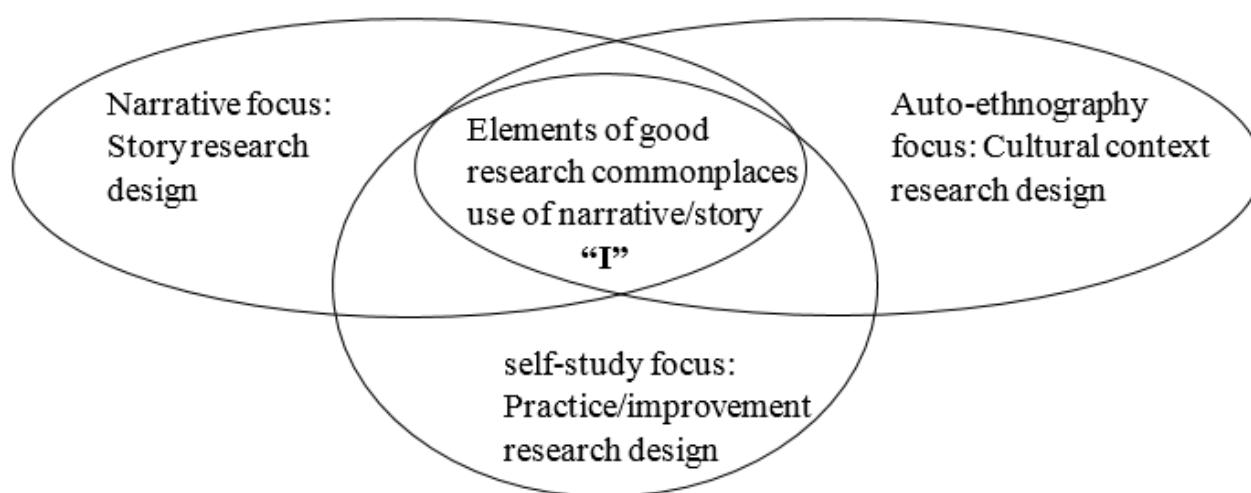


Figure 1: Venn analysis of the three methodologies (Hamilton *et al.*, 2008, p. 24)

Following is an articulation of each SBM from above, and Mason’s (2002) Discipline of Noticing as a methodology, which I have utilised within my own research.

Self-study

The term self-study points to the *focus* of the study rather than any particular approach or set of methods. Across existing self-study literature, a range of research methods are utilised and consequently a range of reporting styles are evident. The aim of self-study is to support practitioner researchers in seeing differently what they are seeing from the inside. This insider’s perspective is essential to handling the complexity of teaching about teaching and this complexity “requires a familiarity with practice in concert with maintaining a distance from practice in order to see what is happening while it is happening” (Loughran, 2006, p. 35). The impact of self-study is immediate change in practice since those engaged in self-study refer to the experience of “I” as a “living contradiction” (Whitehead, 2000, p. 93) when it is recognised that a value is held (such as social justice) yet it is denied in practice. It is the study of these living contradictions that is so powerful in creating the conditions for change.

Narrative inquiry

Narrative refers to the stories that people tell. Within narratives, lived experiences are organised into meaningful episodes that allow the narrator to interpret their worlds. The construction of narratives can be seen as the construction of what we call a Self, and, in this construction, one gradually transforms perceptions of direct experience into that of knowledge. Self-based narrative research focuses not only on the experiences of the researcher but also on the meaning given to those experiences. In narrative inquiry, records of experiences are usually taken but then layered with reflection on those experiences (Suazo-Flores *et al.*, 2018).

Autoethnography

According to Roth (2005) “auto/ethnography and auto/biography are genres that blend ethnographic interests with life writing and tell about a culture at the same time it tells about a life” (p. 4). Autoethnography is an autobiographical genre of research and writing that displays multiple levels of self and consciousness. An evocative image of the autoethnographer is triggered by Ellis (2004) in her autoethnographic novel where she refers to the gaze of the autoethnographer “first... focusing outward on social and cultural aspects of their personal experience; then... inward, exposing a vulnerable self” (p. 37). Through this movement back and forth, the “distinctions between the personal and the cultural become blurred, sometimes beyond distinct recognition” (p. 38). Autoethnographers use self-reflection and personal writing (of many forms) to explore personal experience in order to understand it in relation to the wider cultural context.

The discipline of noticing

As part of my own study I looked initially to Mason’s (2002) Discipline of Noticing (DN) as a methodology for my research as an MTE (see Helliwell, 2018). Mason acknowledges that DN stems from a phenomenological underpinning and he makes a strong case for working with lived experience as an alternative to much research that has become a task of refining and using existing theoretical frameworks. For Mason, the central focus of noticing is one’s “own inner experience” (p. 183) that is “awakening.... an inner witness who watches and comments but does not interfere” (p. 184). This inner witness refers to being awake in the moment so that an increasing set of possibilities for action become available. The awakening of this inner witness comes about through engaging with DN which incorporates re-entering moments by reflecting on accounts-of incidents. Through this post-spective process of reflecting on these incidents it is possible to consider alternative ways of acting in the moment. Through labelling particular phenomena that have occurred, it opens up the possibility of recognising that phenomena again in the future and triggering a different response and by communicating accounts of this process, it can become useful for others to try out new ways of acting for themselves. In my own research, I have been reflecting on the

experience of working as an MTE by paying attention to what I notice, in the process of transcribing conversations with mathematics teachers. By returning to Harré's self-model, in light of these existing methodologies, I offer a final examination.

TOWARDS A SELF-METHODOLOGY FOR STUDYING MTE LEARNING

Self 1, the self in the context of perception, "is manifested in the structure of perceptual fields, each of which is centered on the location in space and time of the embodied perceiver" (Harré, 2001, p. 60) and is close to the phenomenologists' understanding of the self in the first-person perspective. Self 1 plays the major role in telling stories of our encounters with the material environment. A self-based study that pays attention to Self 1, looks to methodologies linked to frameworks of noticing and phenomenology. Self 2, the self in the context of reflection on oneself as a person, is the totality of a person's attributes, including their self-beliefs. The capacity to develop a self-concept in this way only comes about through looking at oneself from the outside, through objectifying the self, which is usually then articulated using a narrative form. A self-based study that pays attention to Self 2, looks to methodologies linked to narrative traditions such as narrative enquiry and autoethnography. Self 3, the self in the context of social interaction, refers to the person we are taken to be by others and points to the contrast or consistency between how we perceive ourselves and how we are perceived by others. This self, as a social process, can be described as dialogical, in that impressions of self get interpreted by others which in turn get re-interpreted into the self. A self-based study that pays attention to Self 3, looks to methodologies where the focus is on exploring living contradictions between self-concept and others. In adopting a multiple self-model, ideas, principles and methods from each of these four methodologies (self-study, narrative, autoethnography, DN) can be brought together a legitimate methodology for an MTE developing her expertise.

In embracing SBMs in researching MTE growth and the development of expertise and recognising research based on SBMs as valid contributions to knowledge, much fruitful work can be done in the area of MTE learning. Questions around what, if anything, makes self-based research distinctive for a *mathematics* teacher educator in contrast to teacher educators more broadly could be explored.

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